

## Education

### University of Illinois at Urbana-Champaign

PhD in Computer Science

URBANA-CHAMPAIGN, ILLINOIS, USA

Aug 2014 – May 2020

Advisors: Prof. David Forsyth and Prof. Alexander Schwing

Thesis Committee: Svetlana Lazebnik, Dhruv Batra, Alexander Schwing and David Forsyth

Thesis Title: Learning Multiple Solutions to Computer Vision Problems

### International Institute of Information Technology

B. Tech. with Master of Science by Research in Computer Science

HYDERABAD, INDIA


Aug 2008 – Jul 2014

Advisor: Prof. P J Narayanan

Thesis: Combining Data and Task Parallelism on Hybrid CPU and GPU Systems

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## Professional Experience

 **Amazon – AI** (Managers: Avinash Ravichandran, Marzia Polito, Onkar Dabeer) SEATTLE, USA  
Applied Scientist II, AWS Computer Vision Science Sep, 2019 - Present


- I research and develop novel computer vision and machine learning algorithms to ambiguous problems in areas of Transfer Learning and 3d Vision.
- I write production code to launch the algorithms into AWS Computer Vision services.

 **Amazon – AI** (Manager: Joseph Tighe) SEATTLE, USA  
Applied Scientist Intern May, 2018 - Aug, 2018

- I developed an algorithm to detect visual relationships i.e. interactions between two objects in an image such as man plays guitar, woman kicks football etc.
- The algorithm was ranked 10<sup>th</sup> on leader-board among 140+ submissions in Kaggle competition for ECCV'18 workshop – Open Images Challenge, Visual Relationship Detection Track (Poster).

 **Apple Research** (Managers: Luciano Spinello, Tie-qi Chen) CUPERTINO, USA  
Computer Vision Research Intern May, 2015 - Aug, 2015 & May, 2016 - Aug, 2016

- I developed a real-time CUDA/GPU implementation of a stereo algorithm (2015).
- I implemented a deep learned feature descriptor to match corners of objects in two images (2016).

 **Google Inc** (Manager: Rajesh Chandrashekar) BENGALURU, INDIA  
Software Engineering Intern May, 2011 - Aug, 2011

- I wrote code for backend & UI of Google Apps C-panel to launch useful features in production.
  - The code was written in Java using Google Web Toolkit library, and end-to-end tested with Selenium.
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## Publications

- A linearized framework and a new benchmark for model selection for fine-tuning, arxiv pre-print. Aditya Deshpande, Alessandro Achille, Avinash Ravichandran, Hao Li, Luca Zancato, Charless Fowlkes, Rahul Bhotika, Stefano Soatto and Pietro Perona.
- Fast, Diverse and Accurate Image Captioning Guided By Part-of-Speech, In Proceedings of IEEE/CVF CVPR'19 (Oral). Aditya Deshpande\*, Jyoti Aneja\*, Liwei Wang, Alexander Schwing and David Forsyth.
- Visual Relationship Detection, In ECCV'18 Open Images Challenge Workshop. Aditya Deshpande et al.
- Convolutional Image Captioning, In Proceedings of Computer Vision and Pattern Recognition (CVPR'18). Jyoti Aneja\*, Aditya Deshpande\* and Alexander Schwing (\*= equal contribution).
- Learning Diverse Image Colorization, In Proceedings of Computer Vision and Pattern Recognition (CVPR'17). Aditya Deshpande, Jiajun Lu, Mao-Chuang Yeh, Min Jin Chong and David Forsyth.
- Recovering the 3D Geometry of Heritage Monuments from Image Collections, In Digital Hampi: Preserving Indian Cultural Heritage, Springer. Rajvi Shah, Aditya Deshpande, Anoop Namboodiri, P J Narayanan.
- Learning Large-Scale Automatic Image Colorization, In Proceedings of International Conference on Computer Vision (ICCV'15). Aditya Deshpande, Jason Rock and David Forsyth.
- Fast Burrows Wheeler Compression Using All-Cores. In Ashes workshop of International Parallel and Distributed Processing Symposium (IPDPSW'15) (Oral). Aditya Deshpande and P J Narayanan.
- Multistage SFM: Revisiting Incremental Structure from Motion, In Proceedings of International Conference on 3D Vision (3DV'14). Rajvi Shah, Aditya Deshpande and P J Narayanan.
- Top Down Approach to Detect Multiple Planes from Pair of Images, ACM ICGIP'14 (Oral). Singhal et al.
- Can GPUs Sort Strings Efficiently? In Proceedings of IEEE HiPC'13 (Oral). Aditya Deshpande and P J Narayanan. (Best GPU Paper awarded by Nvidia)

- Geometry Directed Browser for Personal Photographs, In ACM ICVGIP'12 (**Oral**). *Deshpande et al.*
  - Hybrid Implementation of Error-Diffusion Dithering, In IEEE HiPC'11 (**Oral**). *Deshpande et al.*
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## Awards and Service

- **Best GPU Paper Award** at IEEE International Conference on High Performance Computing (Dec, 2013).
  - **Outstanding Reviewer Award** for [IEEE/CVF CVPR 2018](#) and [IEEE/CVF CVPR 2020](#).
  - **Top-400 reviewer for NeurIPS 2019**, selected to mentor at [New in ML workshop](#).
  - **Outstanding contribution in reviewing** by Journal of Parallel and Distributed Computing (Jun, 2016).
  - **Reviewer for Conferences:** CVPR, ICCV, ECCV, NeurIPS, ICML, UAI, ACCV, AAAI, BMVC.
  - **Reviewer for Journals:** TPAMI, TIP, JPDC, JACM.
  - Awarded **Google Summer of Code scholarship** to work on CUDA acceleration of OpenJPEG (2012).
  - Received the **Dean's Merit List** (2008) and **Research Award** (2012) of IIIT Hyderabad.
  - Received the **National Talent Search Scholarship (2006)**, awarded to top-1000 10th graders across India.
  - Merit position in school exams of **Junior Maths Olympiad, National Standard Exam in Physics**.
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## Selected Talks

- Amazon Machine Learning Conference, 2019, Oral presentation of "[A linearized framework and a new benchmark for model selection for fine-tuning.](#)"
  - IEEE/CVF Computer Vision and Pattern Recognition 2019, Oral Presentation of "[Fast, Diverse and Accurate Image Captioning Guided By Part-of-Speech](#)", see the talk [here](#).
  - At – Google AI, Facebook AML, Apple 3D Vision & [Illinois CSL Student Conference, 2019](#) – Invited Talk on "Learning Multiple Solutions to Computer Vision Problems."
  - CS 445 Computational Photography by Prof. Derek Hoiem, 2017, Lecture on "The image as a virtual stage."
  - [CS 598 Data Driven Design](#) by Prof. Ranjitha Kumar, 2017, Lecture on "Generative Adversarial Networks."
  - 2017 Midwest Computer Vision Workshop, Chicago, "Learning Diverse Image Colorization."
  - 2016 Midwest Computer Vision Workshop, Chicago, "Learning Large-Scale Automatic Image Colorization."
  - IEEE International Conference on High Performance Computing, 2013, Oral Presentation of "Can GPUs Sort Strings Efficiently?"
  - IEEE International Conference on High Performance Computing, 2011, Oral Presentation of "Hybrid Implementation of Error-Diffusion Dithering."
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## Projects and Technical Contributions

- **Fast, diverse and accurate image captioning.**  
Developed an AI algorithm that writes a sentence to describe any image. Different humans will describe the image in different ways; our method can also generate multiple descriptions. The code available at <https://github.com/aditya12agd5/convcap> is widely used (125 stars, 39 forks, 250+ citations).
- **Model selection for transfer learning.**  
In this work, I developed an algorithm to select the right model to fine-tune from a model zoo without performing any training. This algorithm is used in a production AutoML system.
- **Learning to colorize black and white images.**  
Developed an AI algorithm to add color to black-and-white image; this can help colorize old photos and movies automatically. Further improved this algorithm to produce multiple versions of color photos. Some results available at <https://bit.ly/2NdD4f7>. The code is made available at <https://github.com/aditya12agd5/divcolor>.
- **Multi-stage structure-from-motion and 3D photo browser.**  
Developed a [multi-stage algorithm for structure-from-motion](#) that first builds a coarse 3d model and then densifies it with more points and camera. This makes structure-from-motion much faster than the standard bundler and visual sfm methods. This method is used to create an immersive [3d photo browser](#).
- **GPGPU/CUDA – Fast dithering, string sorting and file compression.**  
Developed a [fast dithering algorithm](#) for GPUs; this is a vital component of daily-use printers. Developed a fast string sorting algorithm; it is useful for many software applications such as genomics. Developed a parallel algorithm to improve speed of bzip data compression and made file compression on computers faster. The code is available at [https://github.com/aditya12agd5/cuda\\_stringsort](https://github.com/aditya12agd5/cuda_stringsort) & [https://github.com/aditya12agd5/cuda\\_bzip2](https://github.com/aditya12agd5/cuda_bzip2).